

Title: Integrability in Hamiltonian mechanics

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Abstract: Hamiltonian mechanics can be formulated using symplectic manifolds and so called Hamiltonian systems. In the Theorem of Liouville–Arnold, conditions are described, under which solutions of Hamilton equations stay on a torus of dimension equal to the dimension of the configuration space. Examples on application of the Liouville–Arnold theorem are contained. We study the problem of motion in a gravitational central force field in the connection with the Runge–Lenz vector.

Keywords: symplectic manifold, hamiltonian system, Liouville–Arnold theorem, Kepler’s problem